SOIL conservation

U. S. Department of Agriculture
Soil Conservation Service
November 1974

From the Administrator

Speeding Up Soil Surveys

Several years ago in Texas, a developer decided to build a new town on 18,000 acres. He would not start development plans, however, until he had a detailed soil survey by the Soil Conservation Service. The high intensity soil survey which he wanted—and which he paid for—was at a scale of 1 inch equals 500 feet and took 16 months to complete.

That's just one example of how important soil surveys are . . . and how much they are wanted and needed in areas of land-use change.

A major priority goal for the Service in the years immediately ahead is to speed up the process of mapping soils, interpreting the information, and publishing it in forms that decision makers can use.

We especially need to accelerate soil surveys wherever there are plans for major changes in the use of land that may be irreversible or may endanger the quality of the environment.

With each day, private citizens and administrators in cities and in rural areas are seeking information from soil surveys for the selection of sites for waste disposal, homes, buildings, and recreation. With food running critically short and land being plowed up, surveys are needed for selecting the best land that can be used safely for the best yields and also for determining what measures are needed to provide the protection that may be needed.

With limited manpower, we need to explore all possible ways to get soil surveys done—interagency agreements, transfers under the Intergovernmental Personnel Act of 1970, funds from other agencies, whatever it takes. We also need to take advantage of technology—high quality photographs, remote sensing, advanced equipment.

State and local governments and other nonfederal groups that use soil surveys are beginning to share substantially in the cost of them by participating in survey work, by trust fund agreements, or by reimbursing SCS. In fiscal 1973, contributions of funds and services from nonfederal sources for soil surveys totaled nearly $4.7 million. We have 136 cooperative agreements now with state and local agencies to provide funds to accelerate survey work.

This last fiscal year, we published a record 80 soil surveys, and we hope to publish 150 surveys a year by 1977. We published 402 special soil reports, including interim reports.

Communities are having to make land-use decisions fast—and we want to help them choose wisely.

Kenneth E. Grant

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Earl L. Butz
Secretary of Agriculture

Kenneth E. Grant, Administrator
Soil Conservation Service

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Diana Morse
Editor

Maryellen Bertram
Editorial Assistant

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COVER: At SCS offices in Hyattsville, Maryland, Leo Ausilio checks aerial photographs for a soil survey. See photo story on p. 12.

Seventy-Five Years of the Soil Survey

by Vincent J. Price
Information Division, SCS, Washington, D.C.

"In the opinion of the Secretary of Agriculture," the President of the United States told Congress, "this is the most important work of its kind ever undertaken."

The Secretary of Agriculture was the Honorable James Wilson. The President of the United States was William McKinley. The year was 1899, and the work under discussion was the new-fangled Soil Survey.

It wasn't yet called the National Cooperative Soil Survey, and in many ways it was unrecognizable as the sophisticated scientific institution that it is today, but it was from humble beginnings 75 years ago that the Soil Survey grew.

The Survey was largely the brainchild of one man, Professor Milton Whitney, who blended together the concepts of soil analysis and geological survey, and who urged the founding of a national soil survey "from which might be learned the extent and comparative physical and chemical character, climatic relationships, and adaptation to crops of the soils of the United States."

The Early Years

Whitney was the first Chief of the Division of Agricultural Soils. The division was created under the USDA Weather Bureau in 1894, but soon became an independent division within the Department of Agriculture.

On May 3, 1899, with an appropriation of $16,000, Dr. Whitney began field operations of what would become the National Cooperative Soil Survey.

On May 3, 1899, with an appropriation of $16,000, Dr. Whitney began field operations of what would become the National Cooperative Soil Survey. Some 720,000 acres were mapped that year in four separate soil surveys. Surveys of Cecil County, Maryland, and the Connecticut Valley concentrated on two major tobacco-producing areas. In fact, the Connecticut Valley survey had a lot to do with bringing tobacco to the Connecticut Valley. Surveys of the Salt Lake Valley of Utah and the Pecos Valley of New Mexico concentrated on "alkali" soil areas of the West.

The first soil surveyors, as they were called then, included men like Thomas Means, Frank Gardner, Clarence Dorsey, and Jay Bonsteel. They were given elaborately printed and embellished certificates, signed by Secretary Wilson, stipulating that the appointee would be paid the sum of $480 per annum.

Under Whitney's influence, the Soil Survey got off on the right foot from the very beginning, by concentrating on a true soil characteristic—soil texture—as the basis for determining soil types. Whitney believed that soil texture was more important than soil chemistry in plant nutrition although that view was vigorously attacked by other contemporary scientists. The usefulness of soil texture as an important soil characteristic has stood the test of time.

Soil types were the only classification that the early surveys used, and soil surveyors made up types as they went along. Each type name was created from the soil texture plus the area where the soil had been located: for example, Pecos sand or Podunk sandy loam.

Within a few years, the Survey was entangled in soil types, and a new level of soil classification was created, the soil series. The soil series, then, included all soils formed in a given geologic material. By 1906 the Miami soil series, for example, included 16 soils from the glaciated regions, and the Norfolk series included 12 soil types from the coastal plains.

By the same year, several other soil characteristics were also being considered in determining soil series, such as color, organic content, soil structure, drainage, erodibility, and nature of subsoil.

During the early years, soil surveyors often had to develop their own base maps. Geological Survey maps were used whenever possible, but often the soil surveyors would have to make their own maps, working at a scale of 1 inch to the mile.

Field equipment, in addition to the tools of plane-table surveying, included augers, picks, shovels, and—in the West—instruments for determining "alkali." Transportation was by foot, horse, horse-and-buggy, chuckwagon, bicycle, or rowboat.

The hills were full of game in those days. Unfortunately, all too often the game turned out to be the soil surveyors, who found themselves scrapping with bulls, bears, and rattlers. Sometimes the soil surveyors would run afoul of quick-triggered deer hunters or outright desperados. Worse yet, the surveyors might stumble across a still and find themselves surrounded by moonshiners with shotguns.

From the very beginning, soil surveys were meant to be a practical tool. In the early years, the surveys were almost exclusively for farming. To facilitate use of soils data, it was necessary to interpret soils information, and Dr. Whitney made interpretation one of his first goals.

To accomplish this goal, the soil surveyors had to determine the potential of different soils for producing various crops. It would be years before the Bureau succeeded in creating a solid classification of soils, but Whitney began the work from the first days of the Survey.

"The Bureau has never attempted to classify soils according to their current rank as factors in our agricultural output," Whitney said, "but rather to weigh them on the basis of their potentiality, no matter whether they were being used to their full capacity, were lying idle, or were in their virgin state."

The Alabama Agricultural Experiment Station was instrumental in stimulating interpretation. At the station's request, the Bureau made very detailed soil surveys of the experimental farms in Alabama. These surveys provided "laboratory environments" in which to gauge potential productivity of soils. The program was soon to spread to experimental farms in other states.

Some of the early soil surveys raised a storm of controversy.

The hills were full of game in those days. Unfortunately, all too often the game turned out to be the soil surveyors . . .

By and large, though, the soil surveys were greeted enthusiastically, and by the time that Milton Whitney resigned as Chief of the Bureau of Soils, the Bureau had a backlog of requests for soil surveys which would cover more than 750,000 square miles.

The Survey Under Curtis Marbut

In 1913, Dr. Curtis Marbut became the new Chief of the USDA Division of Soils. Marbut had been born in a Missouri log cabin in the middle of the Civil War, but he went on to become a geologist and a renowned professor. At the time he became chief of the Bureau, it was believed that soils were essentially reflections of the geologic formations beneath them. It was Marbut the geologist who ultimately became an "anti-geologist," recognizing that soil science is a true discipline quite distinct from geology.

Marbut was influenced in this view by E. W. Hilgard of California and Cyril G. Hopkins of Illinois, both of whom were bitter opponents of Milton Whitney. But the chief influence on Marbut was the work of the Russian soil scientists, and of Glinka in particular.

In 1916 Marbut, in accordance with the Russian methodology, argued for a much more thorough characterization of soils in terms of the horizons of the soil profile. This put Marbut squarely in opposition to the earlier classification of soils promulgated by the Bureau (and ironically, fashioned in large part by Professor of Geology Marbut himself a few years earlier).

This declaration put the Soil Survey on the right track, but there still was no comprehensive system of soil classification on which to base the soil surveys. In 1920, Marbut began to formulate such a classification.

During those years, another tremendous development took place in the Soil Survey in soil mapping. The National Cooperative Soil Survey has always been a cooperative survey in every sense of the word. Land-grant colleges and other cooperating agencies have made important basic contributions to the scope and thrust of the Survey. One of the most important contributions came from the Indiana Agricultural Experiment Station and Thomas W. Bushnell.

Bushnell was convinced that the best solution to the problem of base maps lay in the use of aerial photographs as a base. In 1929 and 1930, the first county soil survey in the United

States made entirely on large scale airphoto base maps was completed for Jennings County, Indiana. Use of airphoto base maps increased both the scale and the accuracy of soil surveys. By 1931, soil surveyors in Michigan were mapping soil slopes by use of the stereoscope—and doubling the daily rate of mapping progress.

At the same time, new techniques in soil interpretation were gradually developed. These technical changes would eventually result in greatly increased usefulness of the surveys.

Curtis Marbut, working largely on his own, continued to define and redefine a broad classification system for soils. His third and final system consisted of six categories: soil type, soil series, soil family, great soil group, a fifth category based on physical and mineralogical composition of the parent material, and a sixth category consisting of the two classes "pedalfers" and "pedocals," which were differentiated by the horizon of lime accumulation. This final Marbut classification was published in 1935. Marbut died that same year in Manchuria, leaving the Soil Survey a solid framework within which to work.

The Modern National Cooperative Soil Survey

Under Dr. Charles E. Kellogg, who succeeded Dr. Marbut as chief, the National Cooperative Soil Survey continued in a modern world, with a solid framework of soil classification and a firm mapping base in aerial photographs.

Specific systems of soil survey interpretations were developed for the various uses that the soil survey might be put. Perhaps the most important specific system involved the development of yield estimates of particular crops on particular soils under a high level of management.

By 1931, soil surveyors in Michigan were mapping soil slopes by use of the stereoscope—and doubling the daily rate of mapping progress.

With strong support from the scientific community, the National Cooperative Soil Survey won increasing recognition from Congress. By 1950, the federal appropriation for the Survey was about $1 million, with state appropriations adding yet another $750,000.

The Soil Survey deserves much of the credit for generating the Soil Erosion Service, the present SCS. The Soil Survey was instrumental in the operation and management of 10 soil erosion experiment stations which were set up in 1929. Later, many of the men who had worked for the Soil Survey stimulated the creation of the Soil Erosion Service (SES). Chief among these was Dr. Hugh Hammond Bennett, who came from the Soil Survey to head the SES and the Soil Conservation Service.

Perhaps as a result of this close association, the early leaders of SCS recognized the importance of determining land capabilities. SCS instituted a soil conservation survey of its own that was interpreted in terms of the eight land capability classes.

Since the SCS focus was on soil conservation, the two surveys were complementary rather than interchangeable. The parallel survey in SCS expanded the Soil Survey horizon, but it also meant a possible duplication of effort, where both SCS and the Soil Survey would go over the same ground.

This parallel effort was resolved in 1952, when the USDA division handling the soil survey was put under the Soil Conservation Service, and Dr. Kellogg became the first Deputy Administrator of SCS for Soil Survey.

The trend toward more varied use of the soil surveys has continued down to the present. Today soil surveys contain new interpretation for a variety of uses, such as septic tank absorption fields, sanitary landfills, residential developments, and recreation.

In the future, soils information will be widely available through a computerized soil data storage and retrieval system. A few isolated cases of automatic data processing of soils information existed in the early 1960's, but in the period since 1968, computers are beginning to play an increasingly important role in the National Cooperative Soil Survey. Computers are keeping track of the approximately 11,000 soil series and a data bank containing interpretations of all soil series is growing rapidly at Iowa State University.

Both soil classification and cartographic techniques have become more sophisticated in recent years.

A new soil taxonomy, in large part developed under Dr. Guy Smith's leadership, replaces the 1935 classification system of Kellogg, Baldwin, and Thorp (after Marbut). The new taxonomy uses soil morphological criteria — characteristics that you can see and measure, rather than soil genesis alone. In addition, the new taxonomy is quantitative, making identification a question of precise scientific measurement.

The cartographic work of the Soil Survey has been improved

not only by more sophisticated photographic equipment and the use of high-altitude photography, but also by computers. The MIADS system is a computer program which is used to produce maps on a standard computer printout showing the suitability or limitations of the soils of a particular "cell," usually a 40-acre square, for a specific use. The Advanced Mapping System (AMS) program is a computer-driven automatic mapping program which will be polygonal rather than cellular—that is, the maps it produces will have lines rather than series of computer symbols.

In the future, soils information will be widely available through a computerized soil data storage and retrieval system.

Field equipment has become more sophisticated as well. Modern soil scientists now often use mechanical probes that are mounted on their trucks. Field laboratory kits have been developed which allow soil scientists to run soil determining tests in the woods and meadows, with accuracy close to that obtainable in a research laboratory. Still, much of the field work has changed little from those first surveys of 1899. A good deal of walking is still done and many observations of the subsoil are being made with spade and auger.

The National Cooperative Soil Survey is 75 years old. In those 75 years, the Soil Survey has mapped about one and a quarter billion acres—in detailed soil surveys, reconnaissance soil surveys, and, in Alaska, exploratory soil surveys. That's 55 percent of the United States. A good 75 year's work.

The future? It looks scientific, solid, computerized, technical, professional, and promising. ♦

Soviet Soil Scientists Visit SCS

Members of the U.S.S.R. exchange delegation on soils research visited the Soil Conservation Service in Washington, D.C., in October for background information on organization and programs of the Service. Among topics covered were soil surveys, small watershed projects, water resource activities, and field services programs, including conservation technical assistance, plant materials centers, water supply forecasting, and international assistance. The exchange delegation, part of the U.S.-U.S.S.R. Scientific and Technical Cooperation Program, is discussing cooperative research with U.S. scientists on the theme "Water, Gas, Salt, and Heat Transfer in Soils and Utilization of Saline Soils." ♦

Nonfederal Sources Contribute $4.6 Million for Soil Surveys in 1972-73

Contributions to soil survey work from nonfederal sources totaled $4,666,000 in fiscal 1973, with 15 states each providing more than $100,000 in funds and services.

Contributions in funds and services from Ohio—at $617,000—exceeded all other states. Contributions from Iowa were next at $364,000.

In addition, five states contributed more than $200,000 each — Indiana, New York, Pennsylvania, Virginia, and Wisconsin.

Eight additional states contributed more than $100,000 each in funds and services—California, Illinois, Maine, Michigan, Minnesota, North Dakota, Oregon, and Texas.

These contributions include manpower, equipment, and office space, as well as cash reimbursements. For fiscal year 1974, reimbursements alone from nonfederal sources for soil surveys totaled $2.2 million, including $296,000 from Florida, $287,000 from Iowa, and $229,000 from Indiana.

In addition, contributions under trust fund agreements for soil surveys totaled more than $78,000, provided by Texas ($53,000), Washington ($15,000), and Illinois ($10,000). ♦

In Oklahoma

Soil Survey and Tax Assessment

by Earl C. Nance
Soil scientist, SCS, Stillwater, Oklahoma

Tax assessment based on the potential productivity of the soil is gaining the attention of tax assessors in Oklahoma.

Assessors in 41 out of 77 counties are using SCS soil survey data to appraise land by soil properties rather than by levels of management . . . thus not penalizing a farmer for good management.

"The soil survey can be used as an aid in arriving at an equal evaluation for agricultural land," states John Anderson, who has the responsibility for reevaluating all real estate, including agricultural land, for tax purposes in Payne County, Oklahoma.

The procedure, basically, is to assign ratings to the soils based on productivity. The ratings in Oklahoma are based on the soil being used to its fullest agricultural capacity.

Once ratings have been assigned, many tax assessors place a dollar value on each of the ratings. By using the soil survey on aerial photographs and using an acreage measuring device, the assessor can record the acreage of each soil on a given farm and multiply it by its per acre value. Adding these together gives the agricultural value of the land.

Ratings for each of the soils in Oklahoma were assigned after the average annual production of crops, grasses, and trees had been determined for all soils in the state.

These ratings range from 5 to 100. Soils with a capacity for high yields for many agricultural plants are assigned a high rating; those with low yields and adapted to few agricultural plants have a low rating.

Soils suited for growing cultivated crops are rated from 40 to 100. Those best suited for pasture grasses are rated from 35 to 60. Soils suited only for range or forest are rated between 10 and 35. Miscellaneous land types such as oil-waste are normally given a rating of 5.

As an illustration, some soils of the Panhandle of Oklahoma are on broad, level areas with an annual average rainfall of 18 inches. For dryland farming these soils are best adapted to growing wheat and grain sorghum. But with this limited crop adaptation, and restricted yields due to limited rainfall, a rating of 60 is assigned. Soils with similar physical properties but with wide crop adaptation and potential yields in the 45-inch rainfall area of southeast Oklahoma are given a rating of 100. The same procedure is used for pastureland and rangeland.

Most soils in Oklahoma that are best suited for growing pasture grasses range from 3 to 9 animal unit months (AUM) of productivity per acre, per year. Those with the fewest animal unit months of productivity are given the lowest rating. Similarly, for rangeland—basically native grasses, normal production is from 500 to 7,000 pounds per acre, dry weight, and the lowest production receives the lowest rating.

Ratings for soils best suited for forest are also based on potential productivity, but are just the opposite of other agricultural ratings. In Oklahoma, woodland is rated 1 to 5 with the lowest productivity at 5. Thus, in the case of forests, the highest rating goes to woodland rating 1.

To achieve consistency throughout the state, all soils are assigned an index rating. Then as tax assessors use the ratings in their evaluations of agricultural land, they can modify the system to fit local conditions. For instance, farmland near a town would be assessed differently than land further out.

With about 93 percent of the land in Oklahoma having a completed soil survey, tax assessors are becoming more knowledgeable of soils and their potential productivity—and the role the survey can play in reevaluating land for tax purposes. ♦

Here's a sample of how a tax assessor might set up a productivity rating for soils in his county, using the highest level of management, as is done in Oklahoma. The most productive soil in the county would be rated 100, the least productive would be rated 5, and the other soils would be rated in between.

	Wheat		Grain sorghum		
Kind of Soil	Average bu./acre	Productivity rating	Average bu./acre	Productivity rating	Soil rating
Soil 1	40	40	60	40	80
Soil 2	30	30	40	27	57
Soil 3	20	20	33	22	42

New Brochures Answer Questions on Soil Surveys

"Hello, Soil Conservation Service? Hi, I'm calling from the Jones Development Corporation and we're investigating sites for a second-home development along Lake Winnebago. How can soil surveys help us choose the best site and what development hazards are revealed in the surveys?"

"Hello, Soil Conservation Service? This is Robert Hill from the Public Works Department. We're trying to locate a new site for a sanitary landfill, and wondered whether the county's soil survey has interpretations for waste disposal."

"Hello, Soil Conservation Service? I'm a farmer up north of Bagley and I'd like to try raising that new crop, wild rice. But I just don't know whether I could raise wild rice on my soil. Does that soil survey have anything in it that'd tell me what I need to know?"

Every field office of SCS has requests like these. Land use planners, land appraisers, construction engineers, ranchers, homebuyers, and many others call or write asking how soil surveys can help them.

A new series of USDA publications will help answer the questions for many different soil survey users and many common soil survey uses.

Of the nine new brochures, one, entitled "Soil Surveys Can Help You" (PA-1054), is a general look at some of the many ways soil surveys are used. Each of the other eight brochures is directed at a particular problem that different people face when referring to a soil survey:

"Farmers and Ranchers . . . Soil Surveys Can Help You" (PA-1047) tells farmers how to use a soil survey to plan conservation practices, to find out what crops will grow best on their soil, and to estimate yields. Ranchers can use a soil survey to determine range potential, to estimate the likely benefits of various range management or grazing management practices, and to decide which range areas to use for pasture or for hay.

"Appraising Farmland . . . Soil Surveys Can Help You" (PA-1052) tells bankers, tax assessors, and others interested in evaluating farmland how to use soil maps and yield estimates by soil type to develop productivity ratings for farms to reflect the potential productivity of the soil, rather than the quality of present farming management.

"Developers and Builders . . . Soil Surveys Can Help You" (PA-1049) tells how to plan better projects and avoid cost overruns by anticipating soil hazards such as seasonal or occasional flooding, wetness, erodibility, poor bearing capacity, and slippage.

"Construction Engineers . . . Soil Surveys Can Help You" (PA-1048) explains how soil surveys can reveal properties which would require special structural measures to overcome or special maintenance once construction is completed.

(continued on p. 11)

On Island in Maine

Soil Survey Helps Protect Water Supply

by **Bryce W. McEwen**
Soil scientist, SCS, Auburn, Maine

Landmark legislation, a court order, and a soil survey have added up to the protection of a community's water supply around Sebago Lake in Maine.

The problem started several years ago when Frye Island in Sebago Lake was sold to a land development company which subdivided the island's 900 acres into 1,400 lots.

The pine-covered island, which had long been a boys' summer camp, was in a township which had no standards or plans regulating development . . . and no public sewage system. Frye Island was dependent on septic tanks to dispose of human waste.

Just what effect the development would have on the quality of Sebago Lake was of vital importance to the Portland Water District, where 155,000 people in 14 towns and cities depend on the lake for their water supply.

Thus, the Portland Water District and the State of Maine filed legal action for a court order to stop development of the island until adequate plans and soils information were available to insure a safe public water supply in Sebago Lake.

They were able to do this through landmark legislation on site location and minimum lot size in Maine. The law establishes standards and procedures for land development involving lots of more than 20 acres or 60,000 square feet of buildings. It applies to any individual or corporation intending to build or operate a development which will "substantially" affect the local environment. One of the requirements for development is that it must be built on soils suitable for the proposed land use.

Following a soil survey of Frye Island, eight soil suitability maps were prepared for use in planning development of the island.

The state has a Soil Suitability Guide for Land Use Planning, developed by the Soil Conservation Service in cooperation with the Maine Soil and Water Conservation Commission, the Maine Agricultural Experiment Station, and other state agencies and groups.

Developed in 1967 and revised in 1969, the guide is the basis for judging the suitability of soils for many uses and is the document used by state agencies to determine soil suitability. Identification of soils in the guide is by soil survey mapping units.

The Portland Water District, through the Cumberland Soil and Water Conservation District, then requested the Soil Conservation Service to make a soil survey of Frye Island.

A medium intensity soil survey was made at a scale of 1:15,840 and a set of eight soil suitability maps were prepared for use in planning development of the island.

With these soils data and the state requirements for site location and lot size, a court order was issued that allowed the developer to continue planning development on suitable soils.

The developer is required to submit plans and request construction permits for develop-

ing a number of lots each year. A private consultant soil scientist is required to make an onsite soils investigation of each proposed lot to determine the suitability of soils on that site for septic tank sewage disposal and for the proposed building.

This information and the developers' plan are reviewed by the Portland Water District and the Maine Department of Health and Welfare. If these agencies approve the plan, then a building permit is issued.

Over a period of 3 years, 51 building lots were investigated on Frye Island and 18 of these were determined to be unsuitable.

Three lots, developed before the onsite soil suitability procedure, have experienced soil-related problems. On one, a building was moved to a new, suitable site and on the other two, the lot size was increased to provide soil suitable for septic tank sewage disposal.

Estimates, developed through the use of the soil survey, are that Frye Island can carry about one-half of the cottages and buildings originally planned without degrading the quality of the environment and the water in Sebago Lake.

To date, there has been no detectable adverse effect on Sebago Lake. The island is now being planned and developed by the company with strict adherence to soil suitability, erosion control, and waste disposal. ♦

Development continues on Frye Island on suitable sites. A private consultant soil scientist makes onsite soils investigations of each proposed lot to determine the soil suitability for septic tanks. This helps protect surrounding Sebago Lake, which provides water for 155,000 people in the Portland Water District.

New Brochures...

(continued from p. 9)

If, unfortunately, neither the developer nor the construction engineer on a housing project has checked a soil survey, "Homebuyers . . . Soil Surveys Can Help You" (PA-1050) tips consumers off to what to look for in a soil survey before investing in a new home.

Sanitarians and public health officials reading "Waste Disposal . . . Soil Surveys Can Help You" (PA-1051) will learn how soil surveys can help solve waste disposal problems—from small feedlot lagoons to full-sized sanitary landfills.

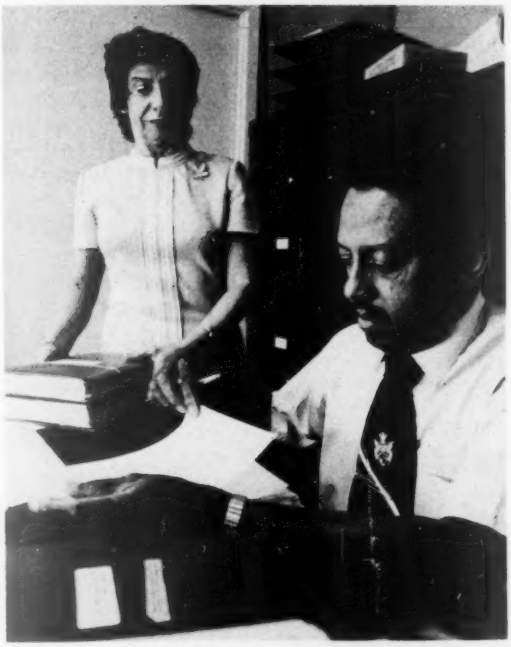
"Recreation Planners . . . Soil Surveys Can Help You" (PA-1053) explains why soil data are needed in selecting and maintaining recreation sites, including woodlands and wildlife areas.

"Land Use Planners . . . Soil Surveys Can Help You" (PA-1055) explains how published soil surveys can help planners determine the suitability and limitations of soils in given areas for houses and commercial buildings, septic tank absorption fields, roads and highways, recreation areas, and other land uses.

The new series of brochures offers basic advice on how to use the soil survey; the survey itself naturally remains the real tool in solving problems. All nine brochures are illustrated with colorful examples of the land uses involved.

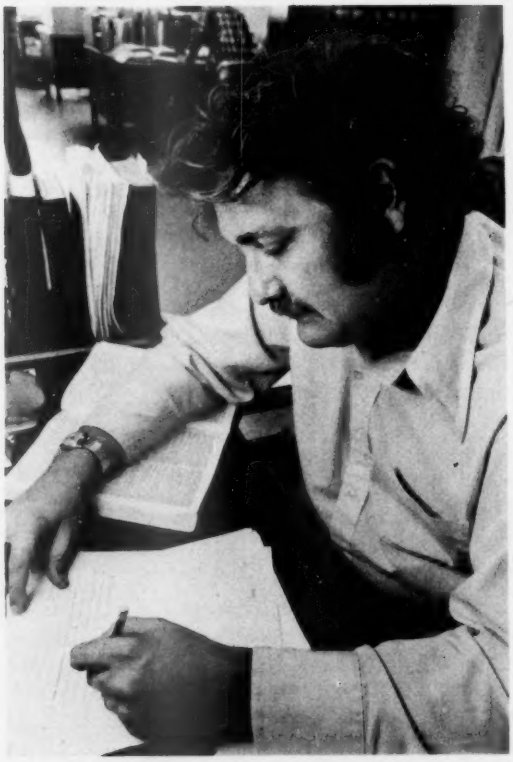
Single copies of the various brochures are available from local SCS offices. Additional copies are available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, at 25 cents a copy. ♦

The (Soil Survey) Buck Stops Here

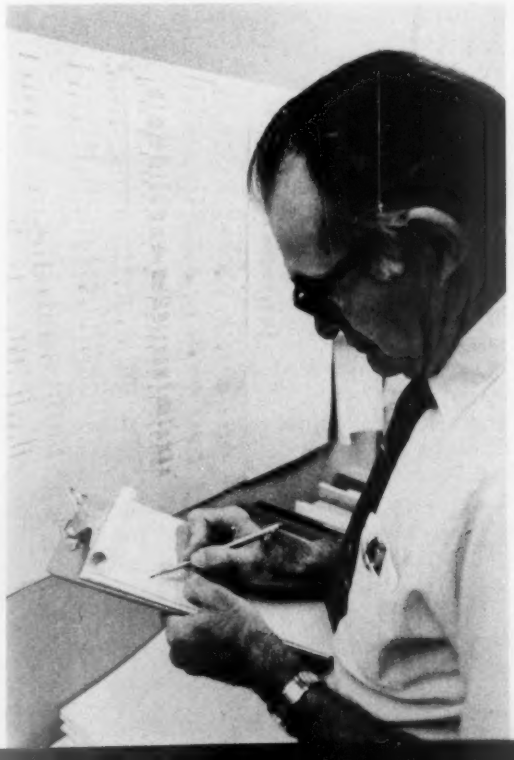


Demand is up for published soil surveys. Last stop for the survey manuscripts before going to the printer is an SCS editorial office near Washington, D.C., where new technology is helping speed a job that has proved too time-consuming in the past. Output already has doubled; it may triple by 1976.

Mary E. Austin presents soil scientist William L. Shelton with a new batch of book-length survey manuscripts from the field. Shelton reviews them for technical soundness; if they measure up, they are turned over to the editing shop.



Head of the soil survey editorial staff is William A. Hamilton (below), who checks the publication schedule to determine which editing jobs receive priority. Scheduling is done by a top-level committee of soil scientists and cartographers.

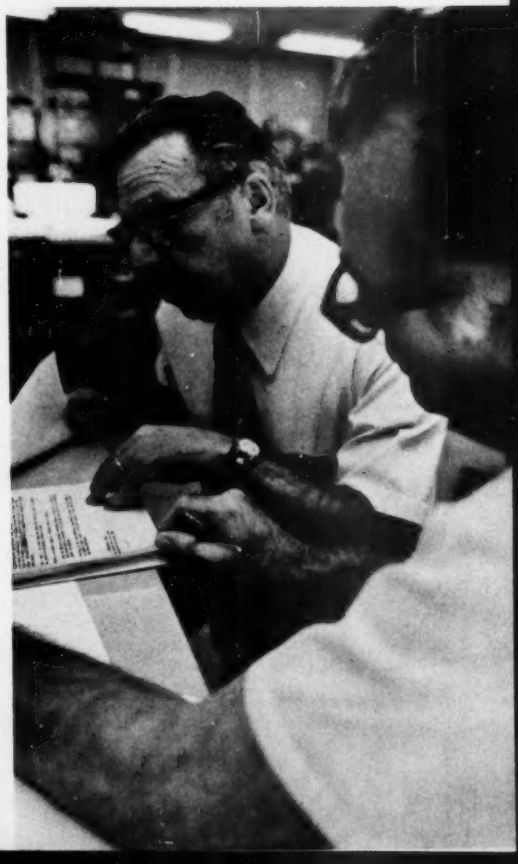


If it appears on the current schedule, the manuscript may be assigned to a "house" editor, like Stan Anderson (above). Manuscripts vary widely in quality; those requiring the heaviest editing are handled by SCS employees.

Editing of other survey manuscripts is contracted to commercial editing firms, but their work is reviewed carefully by SCS senior editors like Marian Smith. Contracting enabled the SCS unit to increase output from 42 surveys edited during fiscal year 1970 to 85 in 1974.

Latest innovation is an editing system using word-processing equipment, prewritten text, and computerized tables. At left, editor Steve Folan shows operator Peggy Sampson how to correct a line of copy on the screen. The corrected manuscript is stored on a tape cassette, which eventually will be used to drive an automatic typesetting machine at the Government Printing Office.

Chief editor Hamilton (below, at right) coordinates scheduling with Cartographic's Bob Wray, head of the map printing section at Hyattsville, Maryland. Aim is to get the printed maps as the edited manuscript is set in type so that both can arrive at the bindery at about the same time. The editing system should enable SCS editors and clerks to increase manuscript output still more. It will eliminate many retypings of corrected pages and much of the laborious and time-consuming proofreading.



Film of aerial photographs comes to the Cartographic Division from contractors all over the nation.

Above, Luther Mayo checks each aerial "run" for compliance to specification.

The photographs are then corrected for scale and annotated to produce photobase map sheets for the soil survey area. Checking completed sheets at left is Leo Ausilio.

Completed maps are then printed for binding into the published survey. Cartographic Division prints some 30 percent of the maps produced each year; the remaining 70 percent are contracted to commercial printing companies.

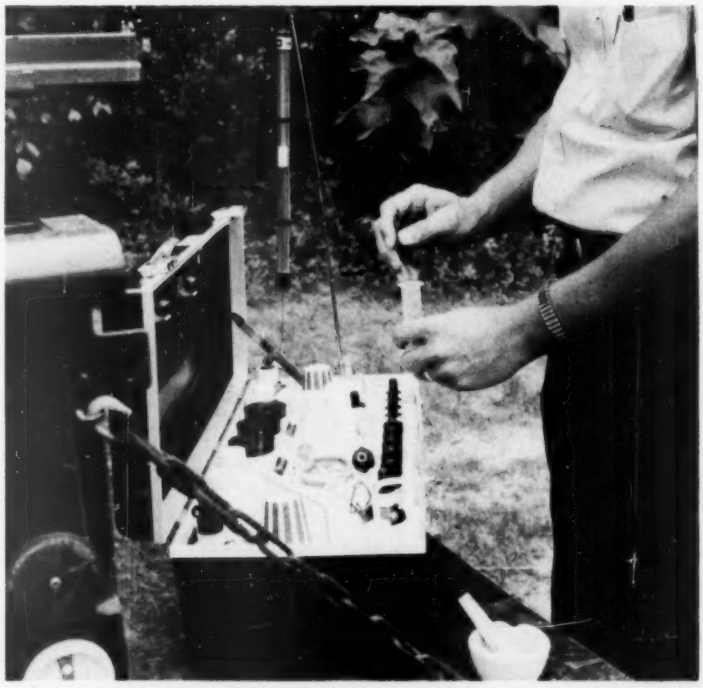
Field Kit Provides On-the-Spot Solutions

by C. M. Thompson, C. L. Girdner, and George Holmgren
State soil specialist, SCS, Nacogdoches, Texas; state soil specialist, SCS, Austin, Texas; and soil scientist, SCS, TSC, Lincoln, Nebraska

A new soil survey field kit is helping soil scientists speed up field work, improve mapping accuracy, and provide on-the-spot solutions to problems of soil taxonomy.

It is particularly timely, since USDA's new *Soil Taxonomy* requires that soil scientists evaluate many different soil properties to classify soils accurately. Many of these properties can be seen, felt, or otherwise identified by simple field techniques. Others require laboratory analysis for accurate determination. Conventional analysis is complex, time consuming, and expensive.

However, if the field soil scientist is to move the soil survey at a rapid rate and have confidence in his decisions, he needs specific and timely knowledge of soil properties. The new soil analysis kit is designed to meet this need for rapid, on-site analysis.



The soil survey field kit enables the soil scientist to set up a laboratory on his truck bed.

The field kit permits determination of over 20 soil properties, including cation exchange capacity, exchangeable bases, acidity, base saturation, soluble salts, calcium carbonate, and gypsum. It was developed by the Soil Survey Investigations Unit of the Soil Conservation Service in cooperation with the Hach Chemical Company of Ames, Iowa. Many of the procedures are unique and new. Others were adapted from existing procedures, particularly those developed by the U.S. Salinity Laboratory.

One place where the kit has been particularly effective is in the East Texas Timberlands. In the complex landscapes of the Gulf Coastal Plain many soils look alike but have significantly different chemical properties.

For example, soils developed on convex surfaces of the Queen City geologic formation have a base saturation ranging from 40 to 55 percent, while closely associated and similar soils developed on the Sparta formation have a base saturation of less than 30 percent. The break between Alfisols and Ultisols Order in soil classification is 35 percent base saturation. This means that these visually similar soils are in different soil orders which reflect some differences in soil be-

havior. Without the benefit of on-the-spot chemical analysis, it would be extremely difficult to obtain a good, accurate soil map in this area. With the help of the kit, it has been possible to discover physiographic and vegetative correlations among the different soils so that it is possible to map these soils with much greater confidence.

The kit has also been helpful in the Texas Gulf Coast Prairie and in the irrigated areas of the Rio Grande Plain where salinity and sodium are problems.

Salinity reduces crop growth and sodium tends to disperse the soil if present in amounts greater than 15 percent of the exchange capacity. With the kit, soil scientists can make on-site evaluations of these soil properties to assist in predictions of soil behavior.

Soil Taxonomy also makes use of the "natric horizon" in defining soil classes. This natric horizon is a clay-enriched horizon that contains more than 15 percent sodium. With the kit, it is possible to determine this important soil property without sending soil samples to the laboratory.

The rapid procedure for determining calcium carbonate has also been very useful. Soils with more than 40 percent calcium carbonate equivalent are grouped separately in *Soil Taxonomy*. These carbonatic soils are droughty because of a lowered water-holding capacity. Crops such as grain sorghum and small grains often exhibit chlorosis (yellowing) when grown on soils high in calcium carbonate. Some highly calcareous soil materials are stable and therefore desirable for construction purposes, depending on the particular purpose.

Use of the field kit to determine soil characteristics has saved much time and money and has, in addition, enabled the field soil scientists to answer many questions about soil properties.

This has freed the Soil Survey Investigations Unit staff for the more complex analysis involved in complete soil characterization studies. Soil classification and correlation work has therefore been made more efficient and accurate.

With the kit, data are accumulated quickly, on-site, and in relation to specific requirements. The field soil scientist is therefore able to develop a broader understanding of soil properties and how these properties affect soil behavior.

As a result, better soil surveys are being made to meet the needs of land use planners, engineers, plant scientists, and ecologists. ♦

Dr. Kellogg Named Honorary Member Of International Society of Soil Science

Dr. Charles E. Kellogg, the Federal Government's top soil scientist for 37 years before his retirement from USDA in 1971, has received the top international honor for a soil scientist–honorary membership in the International Society of Soil Science.

Victor A. Kovda, president of the Society, honored Dr. Kellogg for his contributions to international soil science and to the Society at its 10th International Congress last August in Moscow.

Honorary membership in the society is limited to 15 scientists, although there have never been more than 10 honorary members at any one time.

Dr. Kellogg first headed the USDA Soil Survey in 1934 at the age of 31. In 1952, the work was transferred to the Soil Conservation Service and Dr. Kellogg was named Deputy Administrator for Soil Survey, the position he held at the time of his retirement. He received the Department's Distinguished Service Award in 1950.

He served as secretary on the Committee for Agriculture during the organizing conference of the United Nations Food and Agriculture Organization in Quebec in 1945, and subsequently worked closely with FAO and UNESCO on many conferences and projects. In addition, Dr. Kellogg has worked with agriculture ministers and scientists in many countries, including the Soviet Union, Australia, Israel, Vietnam, Ghana, and India.

DR. KELLOGG

Born on a farm near Ionia, Michigan, Dr. Kellogg received his B.S. and Ph.D. degrees in soil science from Michigan State University. He now lives in Hyattsville, Maryland. ♦

A New Role for Connecticut Soil Scientists

by David Lavine and Edward H. Sautter
Director, Connecticut Inland Wetlands Project, Middletown, Connecticut, and state soil scientist, SCS, Storrs, Connecticut

On the edge of a Connecticut field, a soil scientist explains to members of a local inland wetlands agency about the soils on which they are walking, where the poorly drained soils merge with moderately well-drained soils.

The members have the task of regulating wetland activities, and as they begin to get their feet muddy, the data they've received earlier starts to fall into place.

Such on-site trips are part of a program set up by the eight soil and water conservation districts in Connecticut to help local inland wetland agency members learn about soils and how they are classified.

What makes a soil scientist and the soil survey so important is Connecticut's Inland Wetlands and Watercourses Act, passed in 1972.

This act requires a local agency—or the state if no local agency is established—to regulate and license nearly all activities on waterbodies and wetlands in the 169 towns in the state. Anyone who wants to remove or deposit materials on a wetland or watercourse must seek a license.

The act defines wetlands as being all soil types designated as "poorly drained, very poorly drained, alluvial and flood plain by the National Cooperative Soil Survey . . ."

This legislative definition of wetlands includes soils which comprise more than half a million acres in Connecticut—about 1 out of every 5 acres in the state.

Frequently, the local inland wetlands agency members have had little or no experience in recognizing or knowing the limitations of wetland soils. That's why the soil and water conservation districts have set up educational programs for these agencies.

In Middlesex County Soil and Water Conservation District, for example, SCS Soil Scientist Dennis Hutchison and District Conservationist Barry Cavanna usually start a group off with some background on soils, followed by an examination of the soil survey maps and how they are made.

However, for the agency members, it is the actual on-site look at wetland soils which brings all the pertinent information together.

Prior to the enactment of the Connecticut legislation, substantial thought was given to soils as the basis for the definition of wetlands. It was determined that the long experience of the Soil Conservation Service in delineating boundaries between soils would simplify the task of determining wetland and nonwetland areas.

Two years of experience with the act have confirmed this judgment, although refinement of wetland boundaries continues.

To assist local inland wetlands agencies, soil and water conservation districts in the state have been entering into Memorandums of Understanding. They provide substantial guidance and technical aid to the agencies in drawing boundaries and determining the limitations of wetland areas where permits have been requested.

While much remains to be done—such as more precise boundary delineation—the first steps have been successfully taken. The soil survey is proving to be an extremely valuable planning tool. ♦

A soil scientist surveys a marsh area in Connecticut.

An ERTS-Based Land Resource Inventory For Mexico's National Water Study

by A. A. Klingebiel and Victor I. Myers

A national water study currently underway in Mexico under the direction of that government's Ministry of Hydraulic Resources grew out of a World Bank Mission Economic Study that concluded:

Long-term economic growth of Mexico would be limited more by the constraint of water than by the lack of any other economic resource.

As the study that began in 1972 progressed with design, guidance, and monitoring assistance from the World Bank, the leaders recognized the need for technical expertise in soil resource evaluation and remote sensing procedures. That's how we were drawn into the picture (Kling fresh from 4 months of retirement; and Vic from his directorship of the Remote Sensing Institute of South Dakota State).

Our assignment was to pioneer in the development of a plan and procedure for the preparation of a potential land use map of Mexico. Our map would be based on interpretation of available soil and related resource data and on the use of Earth Resources Technology Satellite (ERTS) imagery. (For background on ERTS imagery, see p. 12, September 1974 issue, SOIL CONSERVATION.)

We felt that a key item the Mexican government needed from the National Water Study was the location of the greatest potentials for use of water in the production of food and fiber. If officials were to place priorities on water development projects and on water use, they would need to know where benefits probably would be greatest. The efficiency of the present soil and water uses, as well as development of new sources, would need evaluation.

Out of our study emerged soil maps and interpretations that are intended to give the "big picture" of the location and extent of the potential soil resources of Mexico. They offer a guide to the Mexican Government for more detailed studies of those areas that we have determined to have "good" or "fair" potential for development. If specific improvements are planned, such as drainage or irrigation, officials will need more detailed soil studies. The potential land use maps focus on those areas that will provide the greatest benefits for efforts expended. The maps also provide basic information needed for the improvement and adjustment of present farming practices and kinds of crops grown. For example, the maps can be used to show that some areas now used for rice production could be used for other crops, and rice production could be shifted to the more humid Gulf Coast where water is ample and the soils are more suitable for rice.

We reviewed available resources data but concluded that they could not be projected safely to the entire country. Because time ruled out a detailed study of the nation's basic resources, we decided to place available resource data on a reliable map base for easy reference and use. Our first task was to develop a plan to synthesize the resource data available and to develop a pro-

About the Authors . . .

Two former SCSers recently provided guidance to the Mexican Government in a pioneering effort to combine soil resource evaluation and remote sensing procedures to carry out that nation's national water study.

They were: Albert A. Klingebiel, who retired in 1973 as head of the Soils Interpretation Division of the Soil Survey after 36 years of experiences that soil scientists commonly have with bulls, snakes, dogs, swamps, mosquitos, and all the rest; and

Victor I. Myers, currently director of the Remote Sensing Institute, South Dakota State University. Myers spent several years as an SCS irrigation and drainage engineer. Before coming to Brookings, South Dakota, he transferred to ARS in Weslaco, Texas, where he carried out some of the first photo-interpretation work from the ERTS imagery.

cedure that could be used as a basis for the soil resource portion of the water study.

Different base maps had been used in the original preparation of various resource maps. For that reason, we had to reevaluate and adjust some of the boundaries to fit the "true landscape" as shown by imagery obtained from the ERTS. We used the ERTS imagery as the base for our maps. This satellite orbits the earth 14 times per day and each pass covers a strip 185km (115 miles) wide. Sensing devices on the satellite record data in four bands, green, red, near infrared, and a second infrared.

We used three bands. The green band (band 4) provides useful information about crops. Soils generally have greatest reflectance contrasts in the red band (band 5).

Vegetation has very high reflectance in the near infrared band (band 7), making it possible to detect different types and conditions of vegetation. For our purposes, the second infrared band (band 6) was not needed. In these studies vegetation, in many cases, is an indicator of different soil conditions. Moisture strongly absorbs infrared energy, making it especially easy to differentiate moist soils and water areas from the more shallow or dry soil areas. Images obtained when plants on shallow or droughty soils are showing moisture stress will be quite different from those on the same soil when it is wet, or from other soils that are wet. Different kinds of vegetation and major differences in terrain also give different reflectance patterns as well as numerous other soil and landscape features.

The Mexican Government had purchased two sets of composite color transparencies (bands 4, 5, 7) at 1:1,000,000 scale for most of the country. One set represented the wet season (October, November) and one set the dry season (February, March). We used these transparencies at 1:1,000,-000 scale as the base for our maps. For field work, we used prints made from these transparencies at a scale of 1:500,-000. We also used a complete set of ERTS transparencies of band 5 taken during the dry season; band 5 provides information on soils and landscape that may not be apparent on the composites.

In consultation with the Mexican Water Study Group (PNH), we developed a plan to use existing resource data and the interpretation of ERTS imagery to prepare potential land use maps.

We first had overlays made at a scale of 1:1,000,000 from each of the following resource maps: geology, soils (FAO classification), topography (slope groups prepared from available topographic maps by PNH staff), rainfall, present land use (interpreted from ERTS imagery), and cultural features (cities, roads, and other important features). These overlays, which were prepared for each ERTS image, were indexed so that they fit in the proper position when placed over the ERTS transparency of the same scale.

We then tabulated important soil properties and basic soil interpretations, such as yields of important crops and livestock carrying capacity, for each of the principal soils shown on the soil map of the area. These data are useful in relating kinds of soil and soil properties to specific areas that may look quite different on the ERTS image.

Next, photo-interpretation keys were prepared to develop basic resource data and to help interpret differences on the images. Thousands of color tones appear on composite color images (bands 4, 5, and 7). We had to relate color tones, characteristics, and geometric patterns to specific, consistent differences on the ground. Landform, vegetation, drainage patterns, geology, and soil color were used to relate the differences on the images

Finally, all materials prepared and information collected were studied, and resource data were

Ground checks by soil scientists are essential to identify positively the differences observed from ERTS images and from the aerial survey.

evaluated and related to differences on the ERTS images. The first draft of the potential land use map was completed. Each different delineation on the map was given a symbol and the FAO components within the unit were identified and described. Now we were ready to go to the field for aerial reconnaissance and ground checks. We studied two pilot areas. One was near Zacatecas in the more arid part of north central Mexico and the other was in the more humid lower Gulf Coast near Veracruz.

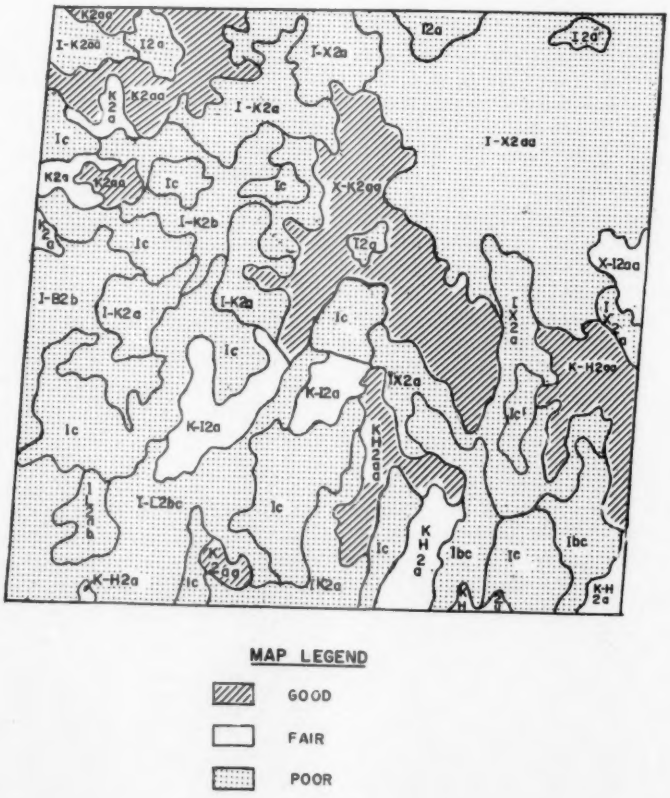
We flew over the areas at about 3,000 feet. Reconnaissance required about 3 hours per ERTS image. The potential land use map on a clear overlay was placed over a print of the color ERTS image. We had a "bird's eye" view of the area and could evaluate the new map by aerial observation and comparison with the image. Notes taken in flight were keyed directly to specific areas on the color print. We also took pictures (35mm) to show the relation of the landscape to features on the image.

Ground checks also were essential to identify differences on the image. We spent several days traversing each area, dug holes to describe and classify soils, observed vegetation, terrain, and other features related to use and management of the soils. We attributed differences on the image to soils, slope, kinds and densities of vegetation, and some were unexplained. We visited agricultural experiment stations so that we could relate crop yields and other data to soils in the area.

After a week in each pilot area, we were convinced that our procedures had been satisfactory. We then compiled the observations and data from the field and revised the first draft into a final map. Final descriptions of each mapping unit were prepared and soil properties and soil interpretation tables were completed to conform with the final map.

From the final potential land use map, we prepared many interpretive maps. Soil potentials were indicated for cultivated crops, tame pasture and range, erosion hazard, wetness, soil depths, and slope. Areas were evaluated for irrigation, for specific crops, and for other uses. Since the potential land use map is based largely on climate, kinds of soil, and slope, it can be interpreted for many uses. With these maps, the Mexican Government can consider alternatives for use of soils and estimate its total potential for growing food, feed, and fiber. This map will be used to help develop a water policy for Mexico.

We look upon our work as an example of how the experiences we gained in our lifetime have been put to good use for others. And we have satisfaction in feeling that our knowledge adapted to these circumstances can help millions of Mexicans to a better life in years to come. ♦



MAP LEGEND

GOOD

FAIR

POOR

This basic soils map at a scale of 1:1,000,000 was interpreted to show the potential for cultivated crops and tame pasture in the Zacatecas area of Mexico. The soil symbols on the map identify the kinds of soil (FAO classification), including dominant surface soil texture and slope class.

Computer Codes Montana Soil Data

by Jack W. Rogers and Dr. Gerald A. Nielsen
State soil scientist, SCS, Bozeman, Montana, and professor of soil science, Montana State University, Bozeman, Montana

A field soil survey program using automatic data processing in McCone County, Montana, could serve as a model nationwide.

Dr. Gordon L. Decker, soil scientist with the Soil Conservation Service, has been studying the opportunities of using computers to expedite soil survey programs This work is being carried on in cooperation with Montana State University.

Heretofore, keeping track of the detailed characteristics and capabilities of the more than 700 different kinds of soil in Montana required time-consuming note taking, typing, and bookwork. With the computer system, field scientists can now make a pencil stroke and record facts on a computer form.

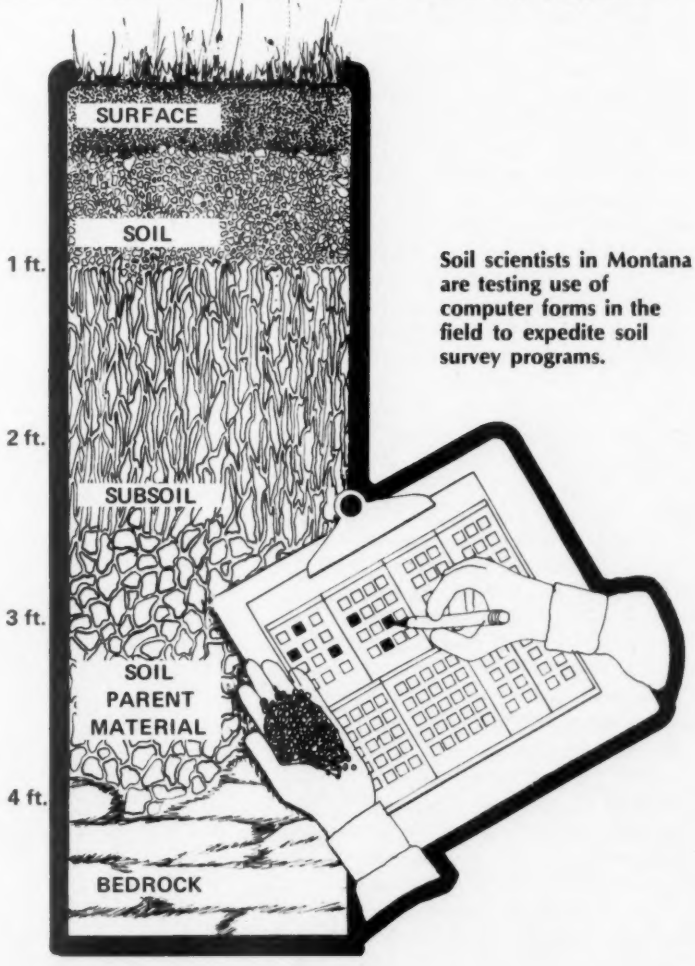
After being marked in the field, the forms are sent to Montana State University where written soil descriptions are produced by the computer and information is stored on computer magnetic tape. A detailed description of a given soil can be retrieved from the computer for a few cents. Little manual typing is ever required.

Information stored in the computer is used later to prepare legends for soil maps and to help classify and rate the suitability of each soil for a variety of agriculture, recreational, wildlife, engineering, and urban uses. This information is eventually made available to the public in soil survey reports. The stored data are also used in research projects at Montana State University.

Computer forms are now being used in soil survey programs throughout Montana, and further testing will determine their worth on a national scale. This is the first operational test of a proposed national system for coding basic soils information for automatic data processing by computers.

Direct input can be made to the National Pedon (Soil) Data Record being developed by the National Cooperative Soil Survey. This data bank will provide easy access to information about soils anywhere in the United States.

Dr. Decker has developed, and is testing, several computer models for predicting the behavior of soils. These models are part of the continuing effort to maximize the efficiency of field soil survey programs. ♦



Soil scientists in Montana are testing use of computer forms in the field to expedite soil survey programs.

Undaunted... They Did Their Own Inventory

by Jonathan P. Edwards
Soil scientist, SCS, Lake Stevens, Washington

In the late 1940's two brothers in eastern Washington faced a bold decision: Should they break or stay with tradition in operating the 840-acre dryland wheat farm they had acquired from their father?

Harvey and Virgil Schneidmiller's farm is on the rolling loess soils in Palouse-Rock Lake Conservation District. Severe erosion by wind and water was depleting the soil, robbing the brothers of future income.

At the time there was no published soil survey for Whitman County—one would have helped greatly in pinpointing problem areas.

Undaunted, the Schneidmillers made their own resource inventory of the entire farm. They inventoried deep bottomlands, hilltops, ridges, and steep-sloped hillsides, and they analyzed the topography to locate drainages, streams, rock outcrops, and slopes.

Following their own inventory, the Schneidmillers, together with Soil Conservation Service technicians, began tackling urgently needed management decisions.

First they selected crops suitable to soils and terrain. They decided bottomlands could be adapted to sprinkler irrigation and intensive management. SCS designed a dam to impound water in a creek.

The brothers launched a bluegrass seed business that prospered. In the uplands, where soils were rolling and dry, the brothers rotated winter wheat and barley.

The deep, dark topsoils, which had the best yields of grain, needed protection from wind and water erosion. The brothers learned that the light colored subsoils that remained after topsoil was eroded were more expensive to farm and brought smaller returns. Subsoils have less organic matter and require more fertilizer to maintain yields. In addition, equipment is more difficult to operate in preparing these clay soils for crops.

To decrease erosion on the steepest slopes, the Schneidmillers took these slopes out of production and seeded them to grass. Some 60 acres were treated this way.

On the remainder of the farm, the Schneidmillers practiced minimum tillage and left

Virgil Schneidmiller (right), who did much of his own soil survey work on his farm back in the late 1940's, talks with Dennis Roe (center), district conservationist for Whitman County, Washington, and Leonard C. Johnson.

the soil more cloddy, keeping a trashy surface and maintaining stubble mulch on the land. The Schneidmillers pioneered in use of a chisel plow rather than a moldboard in the Palouse. On the fragile loess soil, the chisel has a dual function: It throws only a fourth as much soil downhill and helps maintain stubble mulch and trashy surface, both of which resist erosion.

Close observation shows excessive tillage pulverizes the fragile silt loam loess and increases the erosion hazard. The subsequent SCS soil survey indicated the predominant soils had lime and caliche about 40 inches below the surface. Where erosion ultimately exposed these layers, wheat yields were reduced drastically.

When yields drop to fewer than 10 bushels per acre—as they had—the brothers found it was a waste of time and equipment to farm these areas. In addition, caliche fragments would drift downhill and contaminate productive lower slopes. These problem areas were seeded to grass in strips up to 100 feet wide to hold soil in place and divide the slope along its length for runoff control.

The Schneidmillers turned some of the problem areas they found during their inventory into assets. In gullies with severe erosion hazard potential and in those with rock outcrops, the brothers smoothed draw bottoms and planted them to grass. These grassed waterways also served as access roads to all parts of the farm during most seasons. Dams and silt basins built in the draws collected enough soil to cover bedrock and fill in the draw, bringing into production land that was once a nuisance. ♦

Reviews

Elements of Photogrammetry. Paul R. Wolf. *1974. McGraw-Hill Book Company, New York, New York. 562 pp., illus. $18.50.*

This book has been prepared primarily for use as a text for an introductory course in photogrammetry at the college level. It should also be a valuable addition to the libraries of practicing photogrammetrists, cartographers, surveyors, engineers, foresters, geologists, geographers, landscape architects and others who use photographs in their work.

The book provides a modern introduction to the broad and dynamic field of photogrammetry. It includes topics traditionally found in photogrammetry textbooks such as cameras, photographic geometry, stereoscopy, parallax, radial-line triangulation, flight planning, ground control, and stereoscopic plotting instruments. In addition, this book provides introductory coverage on the subjects of orthophotos, terrestrial photos, oblique photos, panoramic photos, photography and photographic processing, photogrammetric optics, control extension by photogrammetric bridging, photographic interpretation, and remote sensing.

The material in this book has been written using elementary terms as much as possible, and extensive use has been made of illustrations and diagrams. Example problems have frequently been included to clarify computational procedures. In view of the impending adoption of the metric system in the United States, metric equivalents are generally given in parentheses following foot and inch values. In order that the book might be suitable for students of varying levels of mathematical competence, the body of the text has been presented so that knowledge of only elementary algebra, geometry, and trigonometry is necessary.

Chapters are arranged in an order found most convenient by the author during many years of teaching photogrammetry at the Universities of California and Wisconsin. Early chapters establish fundamental principles, while later chapters discuss the more specialized aspects of photogrammetry with emphasis on practical applications. In general each chapter is arranged so that the more important material is presented first.

Although the author is an engineer, the material is presented here in a general manner so that the book has appeal not only for engineering photogrammetry courses, but also for nonengineering courses taught in schools of forestry, geography, geology, agriculture, etc. With its coverage of photography, photo processing, cameras, photographic measurements, photographic interpretation, and remote sensing, the book could also serve satisfactorily for courses in interpretative photogrammetry. — **Jerome A. Gockowski,** *director Cartographic Division. SCS, Washington, D.C.*

Soil surveys

Kentucky

Estill and Lee Counties. By John H. Newton, Carl W. Hail, Thomas R. Leathers, Paul M. Love, Junius G. Stapp, Victor Vaught, and Peter E. Avers. 1974. Soil Conservation Service and Forest Service in cooperation with Kentucky Agricultural Experiment Station. 87 pp., illus.; maps.

Texas

Andrews County. By Nathaniel R. Conner, Harold W. Hyde, and Herbert R. Stoner. 1974. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 45 pp., illus.; maps.

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Meetings

New publications

Conservation Data Bank on Rural Land and Small Watersheds. *1974. USDA Leaflet. 7 pp.* The search for data to evaluate or plan land use, solve problems of small watersheds, or further soil and water conservation begins with data summarized in the National Inventory of Soil and Water Conservation Needs. The leaflet alerts researchers to the availability of this data—now stored on magnetic tape at Iowa State University Statistical Laboratory and continually being augmented—to serve the planning and programing needs of education, government, conservation districts, and industry.

Your Woodland . . . Your Conservation Program. By Carrow T. Prout, Jr. *1974. USDA Program Aid No. 1084. 13 pp., illus.* $0.30. This pamphlet explains how, through woodland conservation, owners of forest land can protect and improve their land regardless of their objectives. It supersedes PA-463, which was entitled *Conservation on Farm Woodlands.*

December

1–3	*American Society of Farm Managers and Rural Appraisers, Inc., Convention and Trade Show, Omaha, Nebr.*
1–5	*American Institute of Chemical Engineers, Washington, D.C.*
3–6	*Western Forestry and Conservation Association, Spokane, Wash.*
5–6	*National Association of Manufacturers, New York, N.Y.*
10–13	*American Society of Agricultural Engineers, Chicago, Ill.*
12–17	*American Geophysical Union, San Francisco, Calif.*

January

5–9	*American Farm Bureau Federation, New Orleans, La.*
15–16	*National Council of Farmer Cooperatives, San Diego, Calif.*
19–22	*National Wool Growers Association and Lamb Feeders Association Joint Convention, San Antonio, Tex.*
27–31	*American Association for the Advancement of Science, New York, N.Y.*
28–30	*American National Cattlemen's Association, Las Vegas, Nev.*

February

2–6	*National Association of Conservation Districts Convention, Denver, Colo.*
6–8	*American Camping Association New England Convention, Boston, Mass.*
6–8	*Catfish Farmers of America Convention, Little Rock, Ark.*
9–14	*Society For Range Management, Mexico City, Mexico*
10–14	*Annual Eastern Snow Conference, Manchester, N.H.*
19–22	*American Camping Association Mid-Atlantic/Southern Regions Convention, Washington, D.C.*
21–24	*American Association of School Administrators, Dallas, Tex.*
23–26	*Land Improvement Contractors of America, San Antonio, Tex.*
23–26	*Sprinkler Irrigation Association Technical Conference, Atlanta, Ga.*
25–26	*American Forest Institute, Atlanta, Ga.*
28–Mar. 6	*Associated General Contractors Convention, Honolulu, Hawaii*